

Post Incident Gold King Mine Monitoring Plan

EPA R8 Draft Straw
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I. Objectives and Study Questions

This document outlines EPA Region 8's monitoring plan, assessment goals and general methods for surface waters and sediments affected by the Gold King Mine Spill. This document outlines monitoring to be undertaken by EPA Region 8 that will support collaborative assessment of the post-incident condition of surface waters by EPA Region 8, its key stakeholders and regulatory partners. States and Tribes may consider this a framework for additional sampling that they wish to undertake. This monitoring plan has been developed for surface waters and sediments. Groundwater monitoring and assessment is outside the scope of this document.

The primary objective of this monitoring effort is to identify potential impacts of the Gold King Mine incident in Cement Creek, the Animas River and sites downstream in the watershed. The study questions identified below provide the context for the rationale used in selecting sampling locations and analytes of interest.

For this effort, it is critical that data be collected at sites in which pre-existing/historic data are available so that pre- and post-incident conditions may be compared and potential impacts quantified. Potential sampling locations are identified in this document. Historic data availability is understood for most of these potential sites or will be determined prior to final site selection. Stakeholders may have additional sites of interest to be added to this monitoring plan. Without historic data for comparison, one may collect data from additional sites, but results may not be assessable with respect to the Gold King Mine incident. Hence, it is important that the selection of additional sampling sites for this plan be consistent with the objectives and study questions described below.

Study Questions:

This monitoring plan primarily serves to answer the following specific questions:

1. Has there been an impact to water quality and sediment quality as a result of the Gold King Mine spill in Cement Creek, the Animas River and downstream sites? Are impacts noted for human health (including recreation and fish consumption), agricultural, and aquatic life uses in the watershed?
 - What are the water column and sediment metals concentrations and how do they compare to pre-incident conditions?
 - If metals concentrations are higher than pre-spill conditions, are they meeting screening levels identified as acceptable for recreation, agriculture, and aquatic life? Screening levels that may be used by R8 include those benchmarks identified as part of the incident response and other water quality standards that apply. Stakeholders and regulatory partners may identify benchmarks and standards against which to compare pre- and post-incident results for their purposes.
 - What are the conditions of the biological communities including macroinvertebrates and fish and how do they compare to pre-incident conditions?

Assessment Objective: The objective of this monitoring plan is to assess pre- and post-incident surface water quality, sediment quality and biology of Cement Creek, the Animas River and downstream waters.

II. Monitoring Frequency and Duration

EPA R8 anticipates that the most intensive sampling will occur in the first year after the spill and in the areas of greatest potential for impact. This monitoring and assessment will end after one year if data confirm that pre-incident conditions or screening levels are attained. At this point, re-establishment of the pre-incident, regular monitoring of these waterbodies will resume. If impacts are greater than expected, monitoring activities may be extended or increased.

The following outlines the expected frequency and duration of monitoring under this plan:

Cement Creek/Animas From Colorado through Southern Ute Reservation:

1. Sept 2015 - Two sampling events per site post-incident
2. March 2016 - One sampling event per site to capture pre-runoff
3. June 2016 - One sampling event per site to capture runoff
4. Fall 2015 or Summer 2016 - Storm events to capture sediment remobilization
5. Sept 2016 – One sampling event per site to capture low flow conditions
6. 2017 - Return to routine monitoring based on results – expect pre-runoff and low flow events

Downstream Segments:

1. Sept 2015 - One sampling event per site post-incident
2. March 2016 - One sampling event per site to capture pre-runoff
3. Sept 2016 – One sampling event per site to capture low flow conditions
4. 2017 - Return to routine monitoring based on results – expect pre-runoff and low flow events

III. Monitoring and Assessment Approach for Cement Creek and the Animas River through Southern Ute Reservation

The following summarizes the analytes of interest, media, sampling schedule, and general assessment approach for Cement Creek and the Animas River from Colorado through the Southern Ute Reservation.

1. Sampling and monitoring schedule:

- **Water Column and Sediment** - dissolved and total recoverable metals
 - Middle and end of September 2015
 - March 2016 (pre-runoff); June 2016 (runoff), and September 2016
 - Storm events Summer 2016
- **Benthos and Fish Tissue** - metals
 - Collect and assess only where pre-existing historic data are available so that spill effects can be assessed. If collected where historic data are not available, these data would not be indicative of spill effects.
 - Once in September 2016
- **Biological Community** – benthic macroinvertebrates and fish
 - Once in September 2015 and again in September 2016
 - Colorado Parks and Wildlife is monitoring the fish community in 2016.

- **Stormwater sampling in Durango, CO.**
 - Water column metals during two to three storm events during Fall 2015 or Summer 2016
- 2. **Monitoring location selection:** Select ten monitoring locations along Cement Creek and the Animas River based upon locations used in the incident response and long-term data availability.
 - Include reference/background sites as necessary.
 - Lake and reservoir sites are likely to drive fish tissue sampling locations.
- 3. **Assessment:** Compare post-incident monitoring data against pre-incident metals levels, risk-based screening levels and applicable water quality standards.

IV. Monitoring and Assessment Approach for San Juan River and Downstream

The following summarizes the analytes of interest, media, sampling schedule, and assessment approach for sites downstream of the Southern Ute Reservation including the San Juan River and downstream waters.

This approach is similar to that described in Section III for water column and sediments, fish tissue, stormwater and runoff events. It does not include the benthic tissues or biological community sampling for benthic macroinvertebrates and fish because these segments are non-wadeable.

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- 1. **Sampling and monitoring schedule:**
 - **Water Column and Sediment** - dissolved and total recoverable metals
 - September 2015
 - March 2016 (pre-runoff), September 2016
 - **Fish Tissue** - metals
 - Collect and assess only where pre-existing historic data are available so that spill effects can be assessed. If collected where historic data are not available, these data would not be indicative of spill effects.
 - Once in September 2016
- 2. **Monitoring location selection:** Select one location at the San Juan River in the Ute Mountain Ute Reservation, one location on the Navajo Reservation near Bluff, UT and one location in Lake Powell based upon those used in the incident response and long-term data availability.
 - Include reference/background sites as necessary.
 - Lake and reservoir sites likely have different baseline data availability and are likely to drive fish tissue sampling locations.
- 3. **Assessment:** Compare post-incident monitoring data against pre-incident metals levels, risk-based screening levels and applicable water quality standards.

V. Potential Sampling Locations

Table 1 includes potential sampling locations for the monitoring described in this plan. Final site selection will be based upon the assessment needs and goals of EPA Region 8, key stakeholders and regulatory partners. Additional sites with historic long-term data are available for consideration as well. Section IX provides associated maps for these locations. Maps will be finalized once site selection is complete.

Table 1. Site names, description and type				
Site Name	Lat	Long	Description/Location	Importance/Rationale
CC-48	37.819984	-107.663275	Cement Creek upstream of Silverton	Historic, long-term data record and incident data available
EPA A68	37.811202	-107.659167	Animas River above Cement Creek in Silverton	Reference condition for this spill; Historic, long-term data record and incident data available
EPA A72/ WQCD 82/ 9359020	37.79027	-107.667578	Animas River at gage below Silverton, downstream of confluence with Mineral Creek	Historic, long-term and incident data record available
EPA A75D	37.59793424	-107.77532681	Animas River upstream of Cascade Creek	Historic, long-term data record; characterizes Animas before tributary influence
Bakers Bridge/GK M02	37.454134	-107.801601	Animas River at Bakers Bridge (CO Hwy. 250)	Historic, long-term and incident data record available
James Ranch	37.41904751	-107.81447356	Animas River at James Ranch, upstream of Hermosa Creek	Historic, long-term data record available; mid-way between Bakers Bridge and Durango
WQCD 9426	37.38506	-107.83686	Animas River near Trimble at CO Hwy 252 Bridge	Historic, long-term data record available; mid-way between Bakers Bridge and Durango
32nd St. Bridge	37.299991	-107.868199	Animas River in Durango at 32 nd St. Bridge	Historic, long-term and incident data record available
Animas – Rotary Park	37.280718	-107.876927	Animas River at Rotary Park in Durango	Historic, long-term and incident data record available
GKM05	37.268704	-107.885857	Animas River, south end of Durango near intersection of 160 and 550 above confluence with Lightner Creek	Incident response site; unclear if long-term data available
GKM01	37.221542	-107.859455	Animas River, just above Southern Ute Reservation boundary	Incident response site; at CO/S. Ute Reservation border
NAR6	37.024806	-107.8738	Animas River downstream of Heaven on Earth Road, Southern Ute	Long-term, pre-incident data available

		Reservation				
SJ-UteMtn	37.000777	-109.029577	San Juan River just north of Four Corners on Ute Mtn Ute Reservation			Need to determine if data are available; location recommended to have site on Ute Mountain Ute Reservation
SJ-Bluff	37.257527	-109.618941	San Juan River at Bluff, UT or just upstream			National Rivers and Streams Monitoring Assessment data available at this location

Table 2 identifies incident and pre-incident data availability by site data type. Data availability will be confirmed for sites where it has not yet been confirmed in order to inform site selection.

Site	Water column - metals	Sediment - metals	Fish tissue - metals	Benthic tissue - metals	Macro-invertebrates	Fish
CC-48	Yes	Yes	TBD	TBD	TBD	TBD
EPA A68	Yes	Yes	TBD	Yes	Yes	TBD
EPA A72/ WQCD 82/ 9359020	Yes	Yes	TBD	Yes	Yes	TBD
EPA A75D	Yes	Yes	TBD	Yes	Yes	TBD
Bakers Bridge/GKMO 2	Yes	Yes	TBD	Yes	Yes	TBD
James Ranch	Yes	Yes	TBD	TBD	TBD	TBD
WQCD 9426	Yes	No	No	No	Yes	TBD
32nd St. Bridge	Yes	Yes	No	No	Yes	TBD
Animas – Rotary Park	Yes	Yes	TBD	TBD	Yes	TBD
GKMO5	Yes	TBD	No	TBD	TBD	TBD
GKMO1	Yes	TBD	No	TBD	TBD	TBD
NAR6	Yes	TBD	No	TBD	TBD	TBD
SJ-UteMtn	TBD	TBD	TBD	TBD	TBD	TBD
SJ-Bluff	Yes	TBD	TBD	TBD	Yes	TBD

VI. Methods

The following analytical and field methods are proposed for sample collection and analysis under this monitoring plan:

1. Dissolved metals in water:
 - ICP-MS Dissolved Metals in Water (EPA 200.8) and ICP Dissolved Metals in Water (EPA 200.7)
2. Total recoverable metals in water:
 - ICP-MS Total Metals in Water (EPA 200.8) and ICP Total Metals in Water (EPA 200.7)
3. Hardness:
 - SM 2340B
4. Total recoverable metals in sediment:
 - ICP-MS Total Metals in Soil (EPA 200.8) and ICP Total Metals in Soil (EPA 200.7)
5. Field methods:
 - EPA Region 8 Water Sampling Standard Operating Procedure (SOP) and Sediment Sampling SOP
 - Macroinvertebrate sampling options – methods may vary by location
 - Use method used for historical/pre-incident data collection
 - EPA's National Rivers and Streams Survey Methods
 - Fish community sampling options – methods may vary by location
 - Use method used for historical/pre-incident data collection
 - Colorado Parks and Wildlife Methods
 - EPA's National Rivers and Streams Survey Methods
 - Fish tissue sampling – methods may vary by location
 - Use method used for historical/pre-incident data collection

VII. Data Assessment

The primary objective of this monitoring effort is to identify potential impacts of the Gold King Mine incident in the Cement Creek, Animas River and downstream sites. The study questions identified in Section I provide the context for the rationale used in selecting sampling locations, analytes of interest and the manner in which data are to be assessed under this plan.

Data assessment is described generally in Sections III and IV. Additional detail regarding data assessment approaches will be developed.

VIII. Field and Analytical Resources

Additional discussion on application of resources is required. This section is provided as a placeholder.

IX. Figures





